

# The Impact of Digitalization on Customers' Satisfaction in Educational Sector: An Empirical Study

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## ABSTRACT

During COVID-19 pandemic, digitalization becomes one of the main important factors for business success and survival, especially in the educational sector. Therefore, this study aims at examining the impact of digitalization on customers' satisfaction in higher education. Information and technology communication and e-service quality were identified as the main variables to measure and evaluate digitalization. Information and technology communication were presented through advantage, compatibility, ease of use and perception, while e-service quality were presented through system quality, instructor and course materials quality and administrative and support system quality. An empirical study was conducted through a survey on undergraduate students of College of International Transport and Logistics, Alexandria, Egypt. Data analysis was performed by using SPSS software. The results demonstrated that there is a significant impact of ICT on customers' satisfaction, e-service quality on customers' satisfaction, and finally digitalization on customers' satisfaction. The research provides an original contribution to knowledge by creating a theoretical framework linking digitalization and customers' satisfaction, which can be used as a tool to enhance level of higher students' satisfaction.

## Keywords

digitalization; e-learning; customers' satisfaction; higher educational sector; information and communication technology; e-service quality

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## Introduction

The education system has been revolutionized by digitalization, but has not diminished both educational value and importance. The educational system was updated and both online and classroom learning were merged. Digitalization provides a support system for modern students. Through applying the right approach, it is possible to save resources and therefore a boost to both whole society and educational sector [1]. Digital technology creation and use has spread like waves over schools and society [2]. Rapid development and expanded access to technology are said to offer new opportunities for teaching and learning [3].

Digital education creates new learning opportunities as students participate online, interactive environments and as faculty shift the instruction methods through the use of hybrid courses, customized teaching, new models of collaboration and a wide array of innovative, engaging learning techniques. In addition, a 21<sup>st</sup> century vision of learner performance requires students to be not only thoughtful digital content users, but also productive and collaborative digital media producer, demonstrating skills and sharing

ideas through creative storytelling, data visualization and content curation [4].

Nowadays, e-learning become more popular than before especially in higher education as the applications of Information and Communication Technology (ICT) provide a wide range of opportunities in teaching and learning for both faculty and students [5]. E-learning is considered as a creative approach to deliver educational services through electronic content forms that boost learners' awareness, skills and outcomes [6].

In addition to traditional learning, e-learning provides students with alternative ranges of learning styles. E-learning can take place whether at home, at work or elsewhere by internet connected through laptops or mobile devices and the e-learning scheme of universities, consequently, e-learning is not restricted to both time and space [7]. Finally, students can totally monitor the speed and pace of their research through e-learning as there is no need to attend physically on campus [8]. Students nowadays are seen as university's customers and all universities require effective measures and steps in order to retain their overall satisfaction [9].

Therefore, the aim of this study is to investigate the impact of digitalization on customers' satisfaction at College of International Transport and Logistics – Egypt. This study is organized as follows: the following section provides literature review, theoretical framework and a set of hypotheses that serve as the background for the model; the third section outlines the methodology that the study follows and the fourth section presents the results and a discussion on the main contribution on digitalization; the final section is the conclusion and it includes limitations for further researches.

### Literature Review

Digitalization means transforming all facets of society and educational contexts, not just work environment. The transformation is happening with or without key activities that guarantee continuous nature of education and learning conditions [10]. Digitalization is defined as “*the process of transition toward non-physical information storage, transmission and processing by using digital technologies*” [11].

Education is one of the main mechanisms to provide individuals with requisite expertise, skills and information. Consequently, research on indicators affecting the academic performance of students in educational institutions has become a topic of rising concern [12]. Digitalization of education is the task of converting traditional teaching methods such as paper document, sound and more into a digital format that can be heard by students to meet overall educational goals and objectives [13].

Digital learning was the sector of imagination. While the digital technologies found their way to enter the world's economies with its all sectors, however the education sector has been more unwilling to open itself to digital world. But that is changing. Over the past decade, the industry for education technology, known as “EdTech industry” has grown steadily. EdTech industry is expected to grow in global market from USD 163 billion in 2019 to USD 404 in 2025. Nowadays, COVID-19 pandemic has a positive impact on EdTech industry, although overall spending on education and training has taken a hit during crisis [14].

Digital education is known as Technology Enabled Learning (TEL) or digital learning and is defined as the creative use of emerging technologies and tools in teaching and learning. Digital learning is technology-facilitated learning that provides students with some control on what they study, where and when. Every day, digital learning replaces traditional educational methods more and more [15].

The provision of information is considered as one of the most important aspects of e-service as its prior significance to exchange information between two individuals. Based on the literature, there is a widespread belief that the internet's capability is mostly used to fulfill the thirst of knowledge and necessity of information in the educational sector [16]. The most important aspect of an e-learning system is the quality of e-learning, which is supplemented by the quality of e-learning tutor, courses' materials and e-learning administration and service support [17].

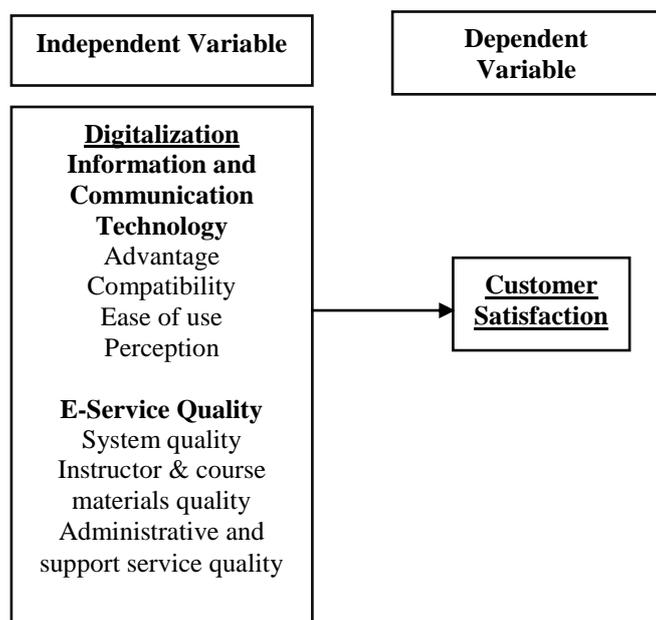
The literature review has demonstrated that the better quality of e-information provided, the better is the whole e-learning system [18]. Due to COVID-19 pandemic, there is a deep need for enhancing overall e-learning system for by adopting higher quality of e-information among students.

Several studies have highlighted that features of quality services have different aspects in forming overall service quality of online service context of education. Therefore, e-information quality is an important part of e-learning sessions that enhance online learning of students in coronavirus lockdown situation [19]. Therefore, digitalization consists of several indicators, which are: ICT and e-service quality. ICT consists of several dimension which are; advantage, compatibility, ease of use, and perception [20]. while e-service quality classified into e-learning system quality, e-learning instructor & course materials quality, and e-learning administrative and support service quality [21].

One of the most important aspects affecting society and business is digitalization. In educational sector, digitalization can be applied and implemented at the levels of educational teaching-learning, administrative, research, evaluation and development as well as for the benefit of society. Individuals benefit from

digitalization in several ways such as time savings, transparency, overcoming geographical barriers, continuous flow 24/7, and minimizing human errors. Furthermore, it generates some drawbacks such as high degree of dependence, physical and mental threats, the use of processes without responsibility, neglect of essential human skills and others [22].

Customer satisfaction is described as the state of enjoyment or disappointment that a customer experiences as a result of product or service's intended benefits and value [23]. Customer satisfaction is described as a determination that the quality standards of information and knowledge or the information and knowledge itself, meets or exceeds customer expectations. Therefore, the highest quality of education associated with e-learning can help universities to increase their customers' satisfaction [24]. Based on the previous discussion, the following figure (Figure 1) will illustrate the theoretical framework of this study



**Figure 1.** Theoretical Framework of Study

The framework (Figure 1) is created based on the literature review with the development of the hypothesis. The framework represents the hypothetical association among the study variables. The hypotheses that will be tested in this research work as follows:

- H1: Digitalization has a positive impact on customers' satisfaction.

- H2: ICT has a positive impact on customer satisfaction
- H3: E-service quality has a positive impact on customers' satisfaction

The following section will present the research methodology by which the aim of the study will be achieved.

## Methodology

As illustrated in the previous section, a narrative review was conducted to extract the main dimensions for measuring digitalization and customers' satisfaction. Up on which, the theoretical framework of linking digitalization to customers' satisfaction was developed.

The research then conducted an empirical study on the College of International Transport and Logistics in Egypt to test the applicability of the proposed framework and to investigate the impact of digitalization on customers' satisfaction of undergraduate students.

A deductive research approach is used whereby quantitative methodology is incorporated, by using a questionnaire in order to test the impact of digitalization on customers' satisfaction. Within the frame of this research, a Likert scale questionnaire was designed and carried out in the College of International Transport and Logistics - located in Alexandria, Egypt. The questions for testing digitalization were derived from the questionnaire designed for testing e-learning by [20]. The questionnaire was distributed to undergraduate students in College of International Transport and Logistics in Alexandria, Egypt in order to evaluate the current e-learning system that is already used in universities. The questionnaire includes 50 questions and measures 3 dimensions. Digitalization includes two main dimensions (ICT and E-service quality), ICT includes four constructs (advantage, compatibility, ease of use, and perception and e-service quality includes three constructs (e-learning system quality, e-learning instructor & course materials quality, and e-learning administrative and support service quality).

For measuring customers' satisfaction, questions were designed based on the questionnaires developed by [25].

Analysis was performed on the data using SPSS 23.

According to the purpose of the study and the type of data collected through survey, the following tests were used:

- **Frequencies:** To measure the frequencies of demographic variables (i.e., gender, educational level, and age groups) and to check whether the data is normally distributed.
- **Correlation and Regression:** To test the hypothesis based on main dependent and independent variables; to check the strength and significance of the relationship between the variables.

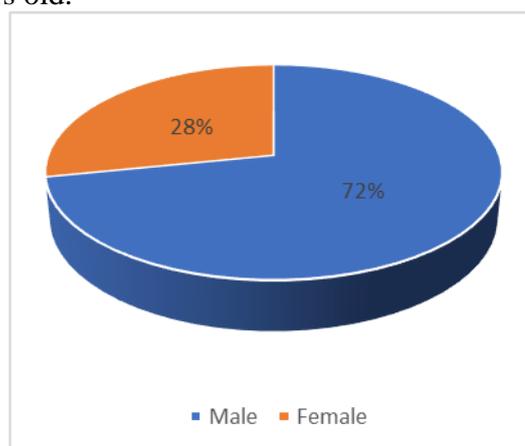
The following section will focus on presenting the results of the survey analysis. First, a descriptive analysis has been obtained to show the nature of the variables under study. Second, a correlation analysis has been conducted to show the pattern linking the variables together. In addition, a regression analysis and models has been fitted to show the impact of the independent and the dependent variable(s).

### Data Analysis and Discussion

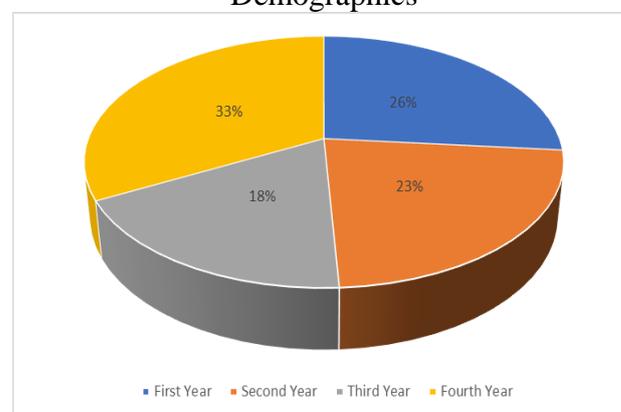
A personally administrative based survey distributed to undergraduate students at College of International Transport and Logistics. The focus of this analysis was investigating the impact of digitalization on customers' satisfaction in College of International Transport and Logistics, Alexandria, Egypt. The survey respondents were from all educational levels (i.e.: first year, second year, third year, fourth year) in the college in order to measure the satisfaction of customers at different educational levels.

An analysis of the survey was conducted using the statistical package; Statistical Program in the Social Science (SPSS) – Version 23, where several tools are used to describe the relationship between the digitalization (ICT and e-service quality) and customers' satisfaction. Descriptive analysis provides summary statistics about the research variables as well as the demographics under study. Figures 2, 3 and 4 present the frequencies of the demographics; gender, education level, and age respectively, where it could be observed that 71.8% of the sample under

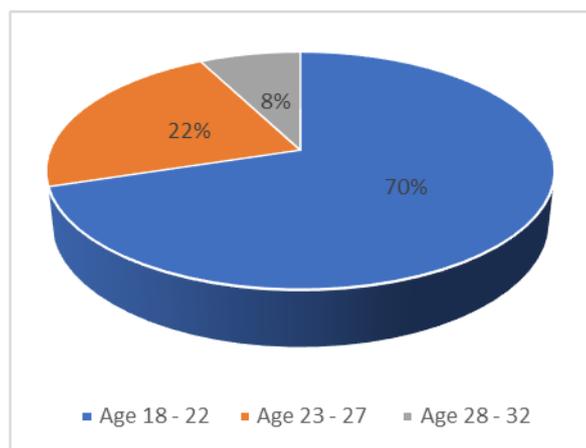
study are males, while 28.2% are females. In addition, 26.5% of the sample under study are students enrolled in their first educational level, while 22.7% are enrolled in their second educational level, moreover 18.1% are enrolled in their third educational level, and 32.8% are enrolled in their fourth and final educational level. Finally, 70.2% of the sample under study are aged between 18 and 22 years old, while 22.3% are students aged between 23 and 27 years old, and finally, 7.6% are students aged between 28 and 32 years old.



**Figure 2.** Frequencies Analysis of Gender Demographics



**Figure 3.** Frequencies Analysis of Educational Level Demographics



**Figure 4.** Frequencies Analysis of Age Group Demographics

Table 1 presents the correlation analysis between the independent variables; advantage, compatibility, ease of use, and perception presenting ICT and the dependent variable; customer satisfaction.

It could be observed that advantage have a significant positive strong relationship with customer satisfaction ( $r = 0.579$ ,  $p\text{-value} < 0.01$ ). In addition, it could be observed that compatibility

have a significant positive strong relationship with customer satisfaction ( $r = 0.617$ ,  $p\text{-value} < 0.01$ ). Moreover, it could be observed that ease of use has a significant positive strong relationship with customer satisfaction ( $r = 0.666$ ,  $p\text{-value} < 0.01$ ). Finally, it could be observed that perception has a significant positive strong relationship with customer satisfaction ( $r = 0.505$ ,  $p\text{-value} < 0.01$ ).

**Table 1.** Correlation Analysis of the Independent Variables (ICT) and the Dependent Variable

		Advantage	Compatibility	Ease of Use	Perception
<b>Customer Satisfaction</b>	Pearson Correlation	.579**	.617**	.666**	.505
	Sig. (2-tailed)	.000	.000	.000	.000
	N	238	238	238	238

Table 2 presents the correlation analysis between the independent variables; system quality, instructor and course materials quality, and administrative and support service quality presenting e-service quality and the dependent variable; customer satisfaction.

It could be observed that system quality has a significant positive strong relationship with

customer satisfaction ( $r = 0.681$ ,  $p\text{-value} < 0.01$ ). Moreover, it could be observed that instructor and course materials quality have a significant positive strong relationship with customer satisfaction ( $r = 0.668$ ,  $p\text{-value} < 0.01$ ). Finally, it could be observed that administrative and support service quality has a significant positive relationship with customer satisfaction ( $r = 0.670$ ,  $p\text{-value} < 0.01$ ).

**Table 2.** Correlation Analysis of the Independent Variables (E-Service Quality) and the Dependent Variable

		System Quality	Instructor & Course Materials Quality	Administrative & Support Service Quality
<b>Customer Satisfaction</b>	Pearson Correlation	.681**	.668**	.670**
	Sig. (2-tailed)	.000	.000	.000
	N	238	238	238

Table 3 presents the correlation analysis between the independent variable; digitalization and the dependent variable; customer satisfaction. It could be observed that digitalization has a significant positive strong relationship with customer satisfaction ( $r = 0.721$ ,  $p$ -value  $< 0.01$ ).

**Table 3.** Correlation Analysis of the Independent Variable (Digitalization) and the Dependent Variable (Customer Satisfaction)

		Digitalization
Customer Satisfaction	Pearson Correlation	.721**
	Sig. (2-tailed)	.000
	N	238

The following table (Table 4) presents the regression analysis testing the impact of the independent variables; advantage, compatibility, ease of use, and perception presenting ICT on the dependent variable; customer satisfaction.

Table 4 represents that there is an insignificant impact of advantage on customers' satisfaction ( $p$ -value =  $0.274 > 0.05$ ). also, there is a significant positive impact of compatibility on customers' satisfaction ( $p$ -value =  $0.10 < 0.05$ ,  $\beta = 0.193$ ). Furthermore, there is a significant positive impact of ease of use on customers' satisfaction ( $p$ -value =  $0.000 < 0.05$ ,  $\beta = 0.411$ ). Finally, there is a significant positive impact of perception on customers' satisfaction ( $p$ -value =  $0.019 < 0.05$ ,  $\beta = 0.144$ ).

**Table 4.** Regression Analysis of Independent Variables (ICT) on Customers' Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.675	.230		2.939	.004
	Advantage	.090	.082	.083	1.096	.274
2	Compatibility	.193	.074	.203	2.610	.010
3	Ease of Use	.411	.089	.371	4.607	.000
4	Perception	.144	.061	.139	2.357	.019

Table 5 presents the regression analysis testing the impact of the independent variables; system quality, instructor and course materials quality and administrative and support service quality presenting e-service quality on the dependent variable; customer satisfaction.

It could be observed that there is a significant positive impact of system quality on customers'

satisfaction ( $p$ -value =  $0.000 < 0.05$ ,  $\beta = 0.374$ ). In addition, there is a significant positive impact of instructor and course materials quality on customers' satisfaction ( $p$ -value =  $0.006 < 0.05$ ,  $\beta = 0.264$ ). Finally, there is a significant positive impact of administrative and support service quality on customers' satisfaction ( $p$ -value =  $0.003 < 0.05$ ,  $\beta = 0.259$ ).

**Table 5.** Regression Analysis of Independent Variables (E-Service Quality) on Customers' Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.326	.230		1.414	.159
	System Quality	.374	.096	.311	3.917	.000
2	Instructor & Course Materials Quality	.264	.095	.229	2.770	.006
3	Administrative & Support Service Quality	.259	.087	.244	2.973	.003

Table 6 presents the regression analysis testing the impact of the independent variable; digitalization and on the dependent variable; customers' satisfaction. It was observed that there is a

significant positive impact of ICT on customers' satisfaction ( $p$ -value =  $0.000 < 0.05$ ,  $\beta = 0.458$ ). Additionally, there is a significant positive impact of e-service quality on customers' satisfaction ( $p$ -value =  $0.000 < 0.05$ ,  $\beta = 0.577$ ). Finally, there is

a significant positive impact of digitalization on customers' satisfaction ( $p$ -value = 0.000 < 0.05,  $\beta$  = 0.920).

**Table 6.** Regression Analysis of Digitalization on Customers' Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.183	.234		.782	.435
	Information & Communication Technology	.458	.115	.383	3.966	.000
2	E-Service Quality	.577	.117	.497	4.924	.000
3	Digitalization	.920	.059	.712	15.559	.000

The following section will present the overall conclusions derived from this study, followed by some recommendations that could be used in further research.

### Conclusion and Recommendations

This paper proposed a framework linking digitalization to customers' satisfaction, then investigated its applicability through conduction an empirical study on educational sector in Alexandria, Egypt. The research revealed that digitalization is a strong facilitator of satisfaction among higher education students in universities in Egypt. The research provides an original contribution to knowledge by creating a theoretical framework linking digitalization and customers' satisfaction which can be used as a tool to enhance educational satisfaction of students, especially during pandemic situation. The finding of this research agrees with the hypotheses of research that support a positive and direct relationship between ICT and customers' satisfaction, e-service quality and customers' satisfaction and finally the digitalization and customers' satisfaction.

The research brings together concepts from the areas of digitalization and e-learning system to enhance level of customer's satisfaction in higher educational sector. Applying this framework allows universities to enhance their level of satisfaction for higher educational students.

This research conducted the empirical study on one college in one geographical region. Further research can apply the developed

methodology and questionnaire on other universities, regions and generate comparative studies that might lead to further directions.

### References

- [1] STAFF. (2020, August 5). *Impact of Education Digitalization*. Retrieved February 2, 2021, from <https://www.legalreader.com/impact-of-education-digitization/>
- [2] Jedeskog, G. (2005). *Changing School: Implementation of ICT in Swedish School, Campaigns and Experiences 1984-2004*. Uppsala University: Department of Education.
- [3] Jahnke, I., Bergstrom, P., Marell-Olsson, E., Hall, L., & Swapna, K. (2017, October). Digital Didactical Designs as Research Framework: Ipad Integration in Nordic Schools. *Computers & Education*, 113, 1-15. doi:<https://doi.org/10.1016/j.compedu.2017.05.006>
- [4] Himmelsbach, V. (2019). *Technology in the Classroom in 2019: 6 Pros & Cons*. Retrieved February 2, 2021, from <https://tophat.com/blog/technology-in-the-classroom-pros-and-cons/>
- [5] Sarabadani, J., Jafarzadeh, H., & ShamiZanjani, M. (2017). Towards Understanding the Determinants of Employees' E-Learning Adoption in Workplace: A Unified Theory of Acceptance and Use of Technology (UTAUT) View. *International Journal of*

- Enterprise Information Systems*, 13(1), 38-49.
- [6] Fazlollahtabar, H., & Muhammadzadeh, A. (2012). A Knowledge-based User Interface to Optimize Curriculum Utility in an E-Learning System. *International Journal of Enterprise Information Systems*, 8(3), 34-53.
- [7] Kilburn, A., Kilburn, B., & Cates, T. (2014). Drivers of Student Retention: System Availability, Privacy, Value and Loyalty in Online Higher Education. *Academy of Educational Leadership Journal*, 18(4), 1-14.
- [8] Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J. J., & Ciganek, A. P. (2012). Critical Success Factors for E-Learning in Developing Countries: A Comparative Analysis between ICT Experts and Faculty. *Computers & Education*, 58(2), 843-855.  
doi:<https://doi.org/10.1016/j.compedu.2011.10.010>.
- [9] Martinez-Arguelles, J. M., Callejo, B. M., & Farrero, M. J. (2013). Dimensions of Perceived Service Quality in Higher Education Virtual Learning Environments. *Universities and Knowledge Society Journal*, 10(1), 268-285.  
doi:<https://link.springer.com/article/10.7238/rusc.v10i1.1411>.
- [10] Schmidt, J. T., & Tang, M. (2020). *Digitalization in Education: Challenges, Trends and Transformative Potential*. Springer Gabler, Wiesbaden.
- [11] Legner, C., Eymann, T., Hess, T., Matt, C., Böhm, T., Drews, P., Ahlemann, F. (2017). Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community. *Business & Information Systems Engineering*, 59(4), 301-308.
- [12] Mwambela, N. K., & Mwendia, S. N. (2019). Digitization Impact Assessment Model for Secondary Schools: Case of Nairobi County in Kenya. *Advances in Science, Technology and Engineering Systems Journal*, 4(3), 194-197.
- [13] Falasteen, N. (2018). The Implementation of Digitalization System in Education in Palestine. *International Journal for Information*, 11(2), 1749-1754.
- [14] Vlies, R. V. (2020, October 6). *OECD Education and Skills Today*. Retrieved February 24, 2021, from <https://oecdutoday.com/coronavirus-school-on-line-how-digital-future-education/>
- [15] Singh, A. (2020, September 7). *What Is The Digital Education System And Its Advantages For Students*. Retrieved February 3, 2021, from <https://www.theasianschool.net/blog/what-is-the-digital-education-system-and-its-advantages-for-students/>
- [16] Talebian, S., Mohammadi, H., & Rezvanfar, A. (2014). Information and Communication Technology (ICT) in Higher Education: Advantages, Disadvantages, Conveniences and Limitations of Applying E-Learning to Agricultural Students in Iran. *Procedia-Social and Behavioral Sciences*, 152, 300-305.
- [17] Pham, L., Limbu, Y., Bui, T., Nguyen, H., & Pham, H. (2019). Does E-Learning Service Quality Influence E-Learning Student Satisfaction and Loyalty? Evidence from Vietnam. *Journal of Educational Technology in Higher Education*, 16(1), 7-15.
- [18] Alkhalaf, S., Nguyen, A., Drew, S., & Jones, V. (2013). Measuring the Information Quality of E-Learning Systems in KSA: Attitudes and Perceptions of Learners. In J. Kim, E. Matson, H. Myung, & P. Xu, *Advances in Intelligent Systems and Computing* (Vol. 208, pp. 787-791). Berlin, Heidelberg: Springer.
- [19] Shehzadi, S., Nisar, Q. A., Hussain, M. S., Basheer, M. F., Hameed, W. U., & Chaudhry, N. I. (2020). The Role of Digital Learning Toward Students' Satisfaction and University Brand Image at Educational Institutes of Pakistan: A Post-Effect of COVID-19. *Asian Education and*

*Development Studies, ahead-of-print*(ahead-of-print).

- [20] Bhat, S. A., & Bashir , M. (2017). Measuring ICT Orientation: Scale Development & Validation . *Education and Information Technologies*, 23, 1123–1143.
- [21] Pham, L., Limbu, Y. B., Bui, T. K., Nguyen, H., & Pham , H. T. (2017). Does e-learning service quality influence e-learning student satisfaction and loyalty? Evidence from Vietnam. *International Journal of Educational Technology in Higher Education*, 16(7), 1-26.
- [22] Bejinaru, R. (2019). Impact of Digitalization on Education in the Knowledge Economy. *Management Dynamics in the Knowledge Economy*, 7(3), 367-380.
- [23] Chen, T., Peng, L., Yin, X., Rong, J., Yang, J., & Cong, G. (2020). Analysis of User Satisfaction with Online Education Platforms in China during the COVID-19 Pandemic. *Healthcare*, 8(3), 200.
- [24] Oduma, C., Onyema, L., & Akiti, N. (2019). E-Learning Platforms in Business Education for Skill Acquisition. *Nigerian Journal of Business Education*, 6(2), 104-112.
- [25] Lee, W. (2010). Online Support Service Quality, Online Learning Acceptance, and Student Satisfaction. *Internet and Higher Education*, 13, 227-283.